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A multi-player model of bower marauding: simulations of destruction

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Bowerbirds are unique among birds in that the male's mating success is dependent on an externalized secondary sexual characteristic: a complex structure he builds called a bower. Males often destroy each other's bowers. However, a male's decision to spend time away from his own bower can be costly, as he may miss opportunities to mate or defend his bower. Pruett-Jones and Pruett-Jones (1994; hereafter referred to as P-J & P-J 1994) developed a two-individual game theory model that examined bower destruction (marauding). They showed that a marauding strategy is superior to guarding. We extended this work by building an agent-based model of male interactions beyond this two-male case and found that marauding was still advantageous. Just how advantageous it was depended on the number of males, number of marauders, and the spacing of bowers on a grid. Marauding was more beneficial with fewer males and a smaller proportion of marauders. Inter-bower distance proved important not due to time spent away from the bower but the effect on the male's preference for nearest neighbors. Thus, counterintuitively, more dispersed environments were better for marauders. This study confirms the results of the algebraic model of P-J & P-J (1994) and suggests that it will be important to empirically examine the trends our model predicts.

Keywords: Game theory, agent-based model, behavioral evolution, male-male interactions, social behavior, bowerbirds